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(21) International Application Number: PCT/GB97/00964 (22) International Filing Date: 7 April 1997 (07.04.97) (30) Priority Data: 9607302.8 9 April 1996 (09.04.96) GB (71) Applicant (for all designated States except ES US): BRITISH UNITED SHOE MACHINERY LTD. [GB/GB]; Ross Walk, P.O. Box 88, Belgrave, Leicester LE4 5BX (GB). (71) Applicant (for ES only): USM ESPAÑA, S.L. [ES/ES]; Ramón Turró, 109 - 5ª planta, Apartado 21083, E-08005 Barcelona (ES). (72) Inventors; and (75) Inventors/Applicants (for US only): SYMCOX, Robert, Owen [GB/GB]; 11 Cross Hedge, Rothley, Leicester LE7 7RR (GB). ARNOLD, Brian [GB/GB]; 43 Orchard Way, Syston, Leicester LE7 2AL (GB). (74) Agents: PARNHAM, Kevin et al.; USM Texon Ltd., Ross Walk, P.O. Box 88, Belgrave, Leicester LE4 5BX (GB).		(81) Designated States: CN, KR, US, VN, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>
(54) Title: SHOE MATERIAL (57) Abstract A shoe material is described which allows any waste as a result of cutting shoe reinforcing components from a sheet thereof to be recycled. The reinforcing material may be recycled by granulating, shredding or co-extruding the waste with a virgin composition of reinforcing material to create sheets of new reinforcing material. These sheets of reinforcing material including recycled waste from previous sheets can similarly be press cut to provide shoe reinforcing components. The reinforcing material includes a base component of either polycaprolactone or linear saturated polyester adhesive along with a copolyester adhesive and mineral filler to achieve necessary stiffness after thermoforming of the shoe reinforcing component, i.e. shoe counter or toe puff.		

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SHOE MATERIALTechnical Field

5 The present invention relates to a shoe material and more particularly to a shoe material used for reinforcing heel or toe sections of footwear.

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Background Art

It will be appreciated that in order to ensure good presentation and form within footwear it is sensible to provide reinforcement in the heel and toe sections. The heel reinforcement is generally referred to as a counter and the
15 toe reinforcement can be referred to as a boxed toe or a toe puff. Obviously, in some safety wear the toe puff can be replaced by a very rigid steel toe cap to provide protection. It should be emphasised that neither counters nor toe puffs are designed to provide foot protection, but are generally
20 utilised to ensure good footwear form during manufacture and sale.

Previously some reinforcing materials within footwear have been made from extruded thermoplastics with a coating of
25 adhesive to facilitate location within the footwear upper components. It will be understood that the reinforcing materials are thermoplastic to allow forming during the manufacturing stages of footwear production. The reinforcing materials are generally heated about a former to produce the
30 desired heel shape and then cooled such that formed shape is retained by the reinforcing material and consequently the shoe upper components.

Reinforcing materials as described above are generally
35 produced in sheet form and the necessary shaped press cut from that sheet. Thus, there may be large areas of unused sheet after the toe puff or counter elements have been cut

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1 therefrom. This wastage may be up to 20% of the sheet area. Obviously, it would be more economical to use more of the sheet if possible or recycle the waste sheet. Unfortunately the adhesive applied to the reinforcing material during
5 manufacture as a sheet can present significant problems if the waste sheet is shredded and the granules re-extruded.

It is an objective of the present invention to provide a reinforcing material composition for footwear that is
10 substantially recyclable.

Technical Improvements

A reinforcing material for footwear, the material
15 comprising by weight, 60-80% of base adhesive component having a softening point in the range 80-90°C and a viscosity of approximately 1000 poise at 230°C, between 0 and 15% copolyester adhesive having a softening temperature in the range 90-120°C and a viscosity in the range 50-10000 poise at
20 150°C, a mineral filler in the range 15-30% by weight and a colour pigment up to 3% by weight of the material, the material being extruded to form a sheet having adequate adhesive properties to allow adhesion to a shoe upper component and the material being thermoformable at a
25 temperature below 90°C to form shoe reinforcing components.

Preferably, the base adhesive component is a linear saturated polyester binder/adhesive such as HM5584AE or Esterpons 1112AF produced by Bostik Ltd., Leicester, England.
30 The mineral filler may be Mica 60 mesh. The copolyester adhesive may be Bostik "T" adhesive or Griltex 8 adhesive produced by EMS-Chemi. The pigment may be titanium dioxide.

The extruding material may have a thickness up to 1.5mm.
35 dependent upon the necessary shoe reinforcement required.

The present invention will now be described by way of example only.

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1 Mode of Carrying Out the Invention and Work Examples

It will be understood that for a counter material to be recyclable it should be possible merely to shred, co-extrude
5 or granulate any waste after the reinforcing components are cut from the sheet material. Consequently, the reinforcing material should preferably be homogenous such that it is not necessary to provide an adhesive coating in order to bond the reinforcing material to any shoe component. Thus, the waste
10 reinforcing material can merely be recycled by elevation above its fusion temperature to consolidate the recycled granules etc.

In the present invention, a combination of a base
15 adhesive component or linear saturated polyester binder/adhesive with a copolyester adhesive is used to create a thermoformable mass as the core of the reinforcing material. In order to provide necessary stiffness a mineral filler is provided to a constituent level necessary to achieve desired
20 stiffness for the reinforcing material. Additionally, a pigment such as titanium dioxide may be added to provide consistent colour.

The preferable linear saturated polyester in the present
25 invention is Bostik HM5584AE produced by Bostik Ltd., Leicester, England. This polyester-based hot-melt binder/adhesive is supplied in a powder form and can be used at a relatively low temperature to form a rigid and tough material. This HM5584AE binder/adhesive has a softening point in the
30 range 80-90°C and a viscosity of approximately 1000 poise at 230°C. The initial particle size in the powder is in a distribution range 100-600µm.

The preferred copolyester adhesive in the present
35 invention is Bostik "T" adhesive produced by Bostik Ltd., Leicester, England. This copolyester has a viscosity of up to 10000 poise at 150°C and a softening temperature in the range 90-120°C. It will be appreciated that the copolyester

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1 adhesive tends to have a higher melting temperature than the saturated linear polyester adhesive and thus tends to soften in accordance with conventional phenomena to a lesser degree under heat activation.

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In order to provide stiffness within the reinforcing material it is necessary to provide a filler and generally, due to its low cost, this filler will be of a mineral nature. The preferred mineral filler in the present invention is Mica 1060 however talc or clay could also be used.

It will be understood by those skilled in the art that the actual weight compositions of the above components can be varied within the scope of the invention. However, it is 15 fundamental that, if the reinforcing material is to be completely recyclable it must provide adequate bonding with upper components at acceptable temperatures in shoe manufacture whilst, achieving appropriate stiffness after thermoforming. It has been found that, acceptable performance 20 can be achieved with the following composition by weight, linear saturated polyester 60-70%, copolyester adhesive 5-15%, mineral filler 15-30% and an additional, possibly filler type, pigment up to 3%. The preferred constitution is linear saturated polyester component 65%, copolyester component 10%, 25 mineral filler 22.5% and pigment (titanium dioxide) 2.5%.

The material is extruded to a thickness in the range up to 1.5mm. as it will again be appreciated that reinforcing material thickness obviously affects the achieved stiffness of 30 the material and the necessary temperatures for moulding. However, as the reinforcing material in accordance with present invention is homogenous both surfaces of the material have an adhesive/bonding nature to any shoe upper components presented thereto. Furthermore, these upper components are 35 generally applied in forced abutment and at elevated temperature with the reinforcing material cut as either a heel counter element or a toe puff element.

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1 It will be understood that the linear saturated polyester component may be replaced by polycaprolactone as the base adhesive component.

5 For recycling, the waste reinforcing material after component cutting is shredded, granulated or simply placed into an extruder hopper and re-melted. The recycled reinforcing material is then extruded as per the original virgin extruded sheet.

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Obviously, it may be possible to use 100% recycled material to create further sheets. However, this recycled material although granulated may have contamination such as oil associated with it. This contamination may be detrimental
15 to the performance of the stiffener material in shoe counters or toe puffs and thus it is convenient to mix the recycled granules etc. with fresh reinforcing material compound for extrusion. Thus, it is advisable only to incorporate less than 50% by weight of any sheet with recycled original
20 reinforcing material.

A dome sample of a shoe material in accordance with the present invention comprising, by weight, Bostik HM5584AE 65%, Bostik "T" adhesive 10%, Mica 60 mesh 27.5% and TiO₂ 2.5%
25 having a gauge of 1.3mm. and a weight of 1990g/m² was found to have an initial deformation strength, i.e. at first dome collapse, of 13.6kg. and after 10 dome collapses of 5.9kg.

It will also be appreciated as an alternative to cutting
30 footwear reinforcing components from a sheet that a powder could be deposited to create the component. This powder comprising the constituents of the reinforcing material could be deposited directly on the footwear components or 'manufactured' upon a transfer mechanism. This transfer
35 mechanism could include a sacrificial sheet or a non-stick plate upon which the powder is deposited.

The powder will generally be deposited using a stencil;

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1 the gauge of the stencil determining powder thickness and so
reinforcing material strength. Once deposited the powder is
activated by heat to consolidate it and so form the
reinforcing material. Once cooled, the reinforcing material
5 may be re-activated by heat to be moulded inside the footwear.
When a transfer mechanism is used the cooled or still hot
reinforcing material shaped by the stencil may be transferred
to the footwear.

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1 Claims:

1. A reinforcing material for footwear, the material including a base adhesive component of 60-80% by weight of
5 material, a copolyester adhesive component of 0-15% by weight of the material, a mineral filler component in the range 15-30% of the material, the reinforcing material being thermoformable at a temperature less than 90°C and being homogenous to ensure an adhesive surface is available for
10 securing to footwear upper components.

2. A material as claimed in Claim 1 wherein the base component is either polycaprolactone or a linear saturated polyester adhesive/binder.

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3. A material as claimed in Claim 2 wherein the linear saturated polyester adhesive/binder is Bostik HM5584AE or Esterpon 1112AF.

20 4. A material as claimed in Claim 1, 2 or 3 wherein the copolyester adhesive is Bostik "T" adhesive EMS-Chemi Gilttex 3.

5. A material as claimed in any preceding claim wherein
25 the mineral filler is Mica 60 or talc or clay.

6. A material as claimed in any preceding claim wherein the material includes a pigment to ensure colour consistency throughout the material.

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7. A material as claimed in any preceding claim wherein the material has a thickness of up to 1.5mm.

8. A material as claimed in any preceding claim wherein
35 the material is formed from up to 50% by weight of recycled similar reinforcing material after said recycled material has had footwear components cut from it and the residue has been appropriately grandulated or shredded for incorporation into

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the present material.

9. A reinforcing material as claimed in any proceeding claim wherein the material is presented to the footwear as a powder.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C09J167/02 C08K3/34 A43B13/04 A43B23/17

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C09J C08K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 323 700 A (BOSTIK LIMITED) 12 July 1989 see page 3, line 1 - line 24; claims 1-5; example 2 ---	1,2,5,7, 9
X	DE 20 51 233 A (EASTMAN KODAK CO) 29 April 1971 see claims 1-8; example 1 ---	1,2,5-7
A	FR 2 378 838 A (BASF AG) 25 August 1978 see page 1, line 5 - page 2, line 9; claim 1 ---	1-5
A	DE 19 12 117 A (DYNAMIT NOBEL AG) 17 December 1970 see claim 1 -----	1-5

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Information on patent family members

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